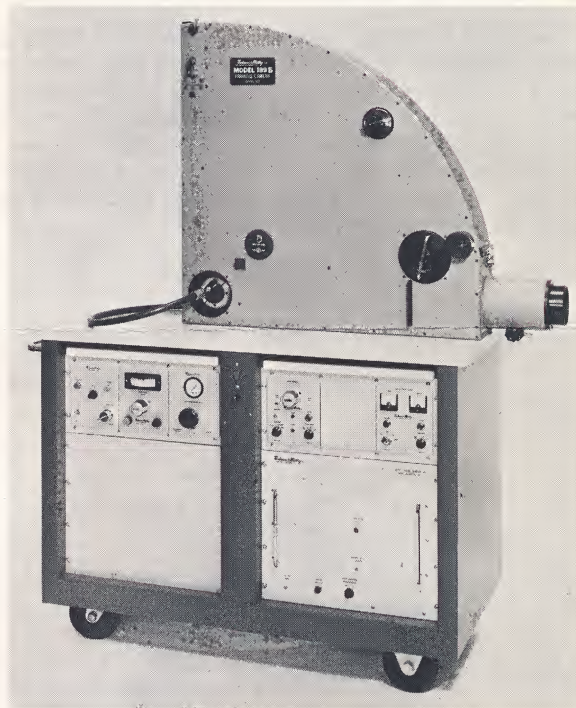


MODEL 189B SYNCHRONIZED FRAMING CAMERA**FEATURES**

- Framing rates up to 20,300,000 pictures per second.
- 120 high resolution pictures.
- Exposure times short as 50 nanoseconds.
- 32 lines per mm resolution.
- Includes proprietary features of the 189.
- Portable or fixed installation.
- Known exposure time—identical for each picture in framing sequence.
- No blind time between frames—entire event recorded.
- Four interchangeable objective lenses.
- Three interchangeable rotating mirrors.



Model 189B records at rates from 250,000 to 20,300,000 pictures per second— $21\frac{1}{2}$ times faster than any other rotating mirror camera. 120 pictures resolved to 32 lines per mm are recorded at exposure times as short as 50 nanoseconds.

APPLICATIONS

Model 189B is designed to meet the requirements of scientists who need pictures of the quality produced by the standard 189 but at much higher framing rates. Typical applications include the study of:

- Hypervelocity Impact
- Plasmas
- Lasers and Laser Effects
- Shocks
- Detonations

OPTICS

To obtain images of excellent quality with minimum aberration and uniform size, 120 selectively matched lens pairs are used in the relay system. These lenses are mounted in a unitized precision machined lens bank that can be easily removed for cleaning.

The optical system is designed so that there is no lost time between frames, and the camera records all of the event which occurs during the recording period.

ROTATING MIRRORS

Three high resolution rotating mirrors with maximum speeds of 5,000, 10,000, and 17,000 rps are available with Model 189B. All three are sealed and guaranteed self-lubricating. No oil pressure system is required and there can be no oil fog on any of the optical surfaces. The 5,000 and 10,000 rps rotating mirrors are made of beryllium, and the 17,000 rps mirror is made of steel.

To minimize the possibility of overspeeding, the turbines on the 5,000 and 10,000 rps mirrors are designed so that beyond top operating speed (far below safe-rated speed) a large increase in air pressure is required to produce a small increase in the rotational speed of the mirror.

The camera records at rates up to 5,970,000 fps with the 5,000 rps mirror; up to 11,930,000 fps with the 10,000 rps mirror; and up to 20,300,000 fps with the 17,000 rps mirror.

INTERCHANGEABLE OBJECTIVE LENSES

Four objective lenses are available with the 189B: 135mm, f/3.5; 250mm, f/4.0; 500mm, f/5.0; and 1,000mm, f/6.3. The lenses are interchangeable and make it possible to operate the camera at a wide range of object distances and magnifications.

PORTABLE OR REMOTE OPERATION

The entire Model 189B system—camera, controls, light source, pulse units—is available integrated in a mobile instrument cart. It is easy to move it from one location to another. For remote operation or permanent installation, all Model 189B system components are available as separate units.

STANDARD FEATURES

In the 189B Framing Camera, a mechanical capping shutter mounted in the objective lens-tube housing gives a 1/25-second exposure triggered by the camera-control firing button. A "Time-Instantaneous" switch and a "Shutter-Open" pilot light are provided for convenient shutter operation. For adjustment of the objective lens, a retractable focusing screen is mounted at one of the framing stations.

STANDARD FEATURES (continued)

The film magazine holds 100 feet of 35mm daylight-loading perforated film—take-up and daylight-unloading being provided by a standard 35mm film cartridge operated with a hand crank. Film footage used is measured by a mechanical counter.

NEW REMOTE CONTROL

The standard Model 100 remote control for the Model 189B Camera contains a power supply, synchronization unit, switching unit, and a regulator controlling air supply to the mirror turbine.

The synchronization unit may be either manual Lissajou or infinitely variable automatic. Mirror-turbine speed is controlled and recorded with an accuracy of ± 0.025 percent with manual Lissajou, and with an accuracy of ± 0.5 percent at 5,000 rps when the automatic synchronization unit is used.

SPECIFICATIONS—MODEL 189B SYNCHRONIZED FRAMING CAMERA

Exposures per run	120
Framing rate, maximum	
5,000 rps mirror	5,970,000 fps
10,000 rps mirror	11,930,000 fps
17,000 rps mirror	20,300,000 fps
Framing rate accuracy between frames, percent	0.01
Mirror operating speed range, rps	
5,000 rps mirror (driving medium: air)	200 to 5,000
10,000 rps mirror (driving medium: air or helium to 7,000 rps, helium above 7,000 rps)	500 to 10,000
17,000 rps mirror (driving medium: air or helium to 9,000 rps, helium above 9,000 rps)	1,000 to 17,000
Air supply pressure, psi	150
flow, cubic feet per minute	60
Helium supply pressure, psi	150
flow, cubic feet per minute	65
Recording time lost between frames	none
Total recording time (120 frames) at maximum speed with each rotating mirror:	
5,000 rps	20 μ sec
10,000 rps	10 μ sec
17,000 rps	5.9 μ sec
Dynamic resolution, maximum	32 lines per mm
Maximum aperture at film with 135mm objective lens	f/13
Relay lens system, image size variation, maximum percent	0.4
Objective lenses	135mm, f/3.5 250mm, f/4.0 500mm, f/5.0 1,000mm, f/6.3
Objective lenses, focal range	10 feet to infinity
Average frame size; inches:	
5,000 rps mirror	0.310 x 0.550
10,000 rps mirror	0.245 x 0.550
17,000 rps mirror	0.127 x 0.330
Film	35mm, perforated
Film magazine capacity, feet	100

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